IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor	:	Michael C. Kautzky	
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Title	:	MAGNETIC SENSOR WITH ELECTRICALLY DEFINED ACTIVE AREA DIMENSIONS	Examiner: Davis, David D.
Docket No.	:	I69.12-0593	

PRE-APPEAL BRIEF REQUEST FOR REVIEW

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INTRODUCTION

This request for review follows the Final Office Action mailed on October 5, 2007. Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request, and the following remarks are presented to explain the basis for this request. Enclosed with this request is a notice of appeal and the appropriate fees.

REMARKS

In the final Office Action mailed on October 5, 2007, claims 1, 3-8, 10-16, and 27-29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin et al. (U.S. Pat. App. Pub. 2003/0189798). To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981 (CCPA 1974). The present conference is being requested because (1) the examiner has omitted essential elements needed for a *prima facie* rejection, and (2) the rejections are clearly improper and without basis.

I. Omission of essential elements needed for a *prima facie* rejection

As amended in the latest Amendment filed July 16, 2007, independent claims 1, 11, and 27 each require the generation of "an electric field in a direction generally transverse to a direction of sense current flow through" a sensor or magnetoresistive stack. 7/16/2007 Amendment at pages 2-4. However, in the final Office Action dated October 5, 2007, the analysis of independent claims 1, 11, and 27 with respect to the question of obviousness does not address or even acknowledge the claim amendments that were made in the July 16, 2007 Amendment. See, 10/5/2007 Office Action at page 2. Consequently, the examiner has not demonstrated that Lin et al. or the art of record teaches or suggests all limitations of independent claims 1, 11, and 27. In addition, the October 5, 2007 final Office Action does not articulate any rationale supporting a conclusion of obviousness for claims 1, 11, and 27. As noted by the Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1396 (2007), the analysis supporting a rejection under 35 U.S.C. § 103 should be made explicit. Due to these omissions, the examiner has not made a *prima facie* case for obviousness.

II. Rejections are clearly improper and without basis

The magnetic sensor of the present invention, as defined by independent claims 1, 11, and 27, has an architecture and function that is fundamentally different from Lin et al. As recited by claims 1, 11, and 27, an electric field is generated in a direction generally transverse to a direction of sense current flow through a sensor stack, which creates a charge-carrier depleted region in the stack (claim 1) to confine the sense current to a smaller area in the sensor (claim 27) that defines the read width (claim 11). In other words, the active sensing area of the magnetic sensor is defined not by the physical profile of the sensor, but rather by the area defined by the charge-carrier depleted region resulting from the applied electric field. See, e.g., FIGS. 1a, 1b, 2a, 2b, and 2c of the present application. By producing an electrical dimension of the sensor stack that is smaller than its corresponding physical dimension, the resolution of the sensor is increased without requiring adjustment of intricate physical dimensions. See page 6, lines 3-6 of the present application. As a result, a device having highly controllable electrical dimensions is produced without requiring separate optimization of other device properties.

Lin et al. fail to teach or fairly suggest a device that defines the read width of the sensor in this way. Instead, Lin et al. teach that the read width is defined by the physical dimensions of the sensor – not by an electric field that creates an electrical dimension that is smaller than the physical dimensions.

In rejecting independent claims 1, 11, and 27, the final Office Action dated October 5, 2007 relies on the disclosure of paragraphs 0004 and 0008 of Lin et al. and the device shown in FIG. 7 in the Lin reference. 10/5/2007 Office Action at pages 2-3. However, neither these two paragraphs nor FIG. 7, alone or in combination with any other portions of Lin et al., teaches or suggests the recited elements of claims 1, 11, or 27.

Paragraph 0004 of Lin et al. gives background information about how one way to improve the performance of hard disc drives is to increase the areal data storage density of the magnetic hard disc, which can be accomplished by developing a sufficiently narrow read head having a narrow read width. However, what Applicants claim and what is novel over the prior art is the concept of generating an electric field in a direction generally transverse to a direction of sense current flow through the sensor stack to reduce the active area dimensions of the sensor. Lin's teaching of the general desirability of a narrow read width by making the physical dimensions of the stack smaller does not teach the specific structures employed to electrically generate a smaller sensor active area, as defined by claims 1, 11, and 27. Thus, paragraph 0004 of Lin et al. clearly does not provide anything that can be fairly interpreted to teach or suggest the concepts recited by claims 1, 11, and 27.

Paragraph 0008 of Lin et al. is the first paragraph of the summary of the invention section and generally sets forth the structure, operation, and fabrication of the magnetic head as disclosed in the detailed description. As stated in the first sentence of Lin's paragraph 0008, the giant magnetoresistance (GMR) read head has a "reactive-ion-etch (RIE) defined read width." RIE is a fabrication technique that is used to define the physical boundaries of an intricate structure. The GMR read head includes "a GMR read sensor and a longitudinal bias (LB) stack in a read region," and in some embodiments a first conductor in two overlay regions. The GMR read sensor in the read region is active since the sense-layer magnetization can be rotated in response to signal fields, while

the GMR sensor in the two overlay regions is inactive. Consequently, "a read width is sharply defined by the boundaries between the read and overlay regions." In other words, the read width is defined by the physical profile of the structure, and not by a charge-carrier depleted region resulting from an applied electric field. Thus, Lin's paragraph 0008, either alone or in combination with the teachings of Lin's paragraph 0004, clearly does not teach or suggest the recited elements of claims 1, 11, and 27.

FIG. 7 of Lin et al. shows a GMR read head 200 including a read sensor 204 and a longitudinal bias (LB) stack 208 in a read region 212. Lin et al., Paragraph 0029. The final Office Action dated October 5, 2007, as well as all previous office actions, do not identify which structures in read head 200 generate an electric field generally transverse to a direction of sense current flow, as required by claims 1, 11, and 27. The October 5, 2007 final Office Action does refer to first two spaced apart portions 262 of first conductor layer 236 and second conductor layer 280 as satisfying the bias electrode limitations of claims that depend from claim 1, 11, and 27. However, neither the cited portions of FIG. 7, nor the related description of these elements, teaches or suggests the recited elements of claims 1, 11, and 27.

First, the description of second conductor layer 280 in Lin et al. is extremely limited, and there is no disclosure related to generating an electric field from this element in a direction generally transverse to sense current flow in LB stack 208. Thus, second conductor layer 280 does not meet the requirements of claims 1, 11, and 27.

Second, Lin et al. teaches that two spaced apart portions 262 are formed by reactive ion etching (RIE) first conductor layer 236, and that each spaced apart portion 262 has a sharply defined opposing face 292 that serves to help define the read width 212 of the GMR read head 200. Lin et al., Paragraph 0031. "The designed read width 212 can be substantially unambiguously attained since three factors for defining the boundary between the read and overlay regions, one physically by the monolayer photoresist width, one magnetically by the LB stack, and the third electrically by the first conductor [236], *all lead to a substantially identical read width 212.*" Lin et al., paragraph 0031, emphasis added. In other words, GMR read head 200 is designed such that the physical read width is identical to the electrical read width. Thus, Lin et al. do not disclose that a

voltage is even applied to any portion of spaced apart portions 262 or second conductor layer 280, much less that the electrical dimensions of read head 200 are a function of an electric field generated by these elements.

The remaining portions of Lin et al. do not supply the deficiencies of FIG. 7, and paragraphs 0004 and 0008, and thus significant elements of claims 1, 11, and 27 are clearly not taught or suggested by Lin et al. Therefore, because the rejection of claims 1, 11, and 27 under 35 U.S.C. § 103(a) is improper and without basis, the rejection of claims 1, 3-8, 10-16, and 27-29 should be withdrawn.

Claims 18-24 were previously withdrawn from consideration as being drawn to a non-elected species. Claims 18-24 depend from allowable independent claim 11. Thus, claim 18-24 should also be considered and allowed, since they depend from an allowable generic independent claim. See MPEP 809.02 and 37 C.F.R. 1.146.

CONCLUSION

Based on the foregoing and the evidence presented in the record, claims 1, 3-8, 10-24, and 27-29 are in condition for allowance. Reconsideration and notice to that effect are respectfully requested.

Respectfully submitted,

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